



MARKED-UP COPY OF
ORIGINAL SPECIFICATION

Ser. No. 10/621,513

Group Art Unit 2875

Examiner A. Ton

**Environment proof treatment for Electro-Luminescent
(EL) element(s)**

This application is a continuation-in-part of U.S.
5 Patent Application Ser. No. 10/170,584, filed June 14,
2002 and Ser. No. 10/285,451, filed Nov. 4, 2002 and Ser.
No. 10/ 286,820, filed Nov. 4, 2002.

~~Background:~~ **BACKGROUND OF THE INVENTION**

10

The current invention relates to EL-element(s),
which may ~~including~~ include a panel, tube, or strip, and
which are ~~arrangements~~ suitable for consumer
applications such as those involving a Shoe, Slide,
15 Slipper, Sandal, Automobiles, Boat, Bus, Aircraft, Garden,
Traffic Equipment, Bag, Purse, House, Building,
Christmas, Seasonal, Bicycle, Tricycle, Toy, Moving
Device, Skating, Jogging, Watch, Garment, Apparel,
Clothing, Jeans, Box, Tool Box, Working Lamp, Furniture,
20 Giftware, Headgear, Jewelry, Hair Accessories,
Partyware, ~~Sign~~ Signs, Indoor lighting, Outdoor lighting,

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Street_Lamp, Guide-~~lamp~~ Lamp, Bridge-~~lamp~~ Lamp, Traffic
Cone, New Jersey Deck, Fence, Mail Box, House Number
Light, Window Sign, Wall Sign, Poster, Pathway, Stair,
Curb, Line ~~divider~~ Divider for People, Evacuation-~~light~~
5 Light, Fishing Marker, Decoration Device for Safety,
Decorating, Advertisement, Promotion,
Point-Of-Purchase, Warning Light, Accent Light,
Illumination light, Floor light, Delineator Guide Light,
Evacuation light, Night light, Multiple Function_Light, or
10 Portable ~~light(s)~~ Light(s) which can be found in the
market place with other light means such as
L.E.D./Incandescent light bulb/ fluorescent tube, Neon
Tube, HID lamp etc.

15 The current invention uses EL-elements having
sufficient light brightness with very low power
consumption as described in the current inventor's
variety of issued US patents including US 5,746,504,
5,980,060, 5,722,760, 5,504,397, 5,475,574, 5,479,325,
20 5,570,946, 5,469,342, 5,570,945, 5,704,705, 5,611,621,
5,860,727, 5,865,523, 5,879,069, 5,572,817, 5,752,337,

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5,794,366, 5,833,508, 5,688,038, 5,871,269, 5,720,651,
5,806,960, 5,947,980, 5,775,016, 5,566,384, 5,876,108,
5,836,671, 5,601,358, 5,754,064, 5,921,653, 5,667,394,
6,082,867, 6,170,958, 6,183,101, 6,171,117, 5,926,440,
5 6,158,868, 6,182,282, 6,179,431, 5,599,088, 5,213,616,
6,169,431, 6,280,053, 6,170,958, 6,168,282, 5,926,440,
5,683,164, 6,183,101, 6,123,616, 6,280,053, 5,926,440,
5,754,064, 5,879,069 and other issued patents owned by
the current inventor.

10

The ~~advantage~~ advantages of using
electro-luminescent(EL) lighting elements in a variety of
contexts are explained in several co-pending US patent
applications including US patent application Ser. Nos.
15 08/305,294; 08/343,404; 08/343,915; 08/383,404;
08/383,405; 08/409,925; 08/421,647; 08/432,707;
08/438,373; 08/444,064; 08/436,007; 08/489,160;
08/498,258; 08/510,701; 08/522,940; 08/561,973;
08/611,049; 08/614,001; 08/522,940; 08/712,484;
20 08/734,872, which cover more uses for ~~an~~
electro-luminescent (EL) element(s).

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~~All~~ None of the listed inventions and conventional market applications ~~can not make provide~~ electro-luminescent elements that are fully environment-proof, which means that they can not overcome damage due to ~~Ultra-Violet, Humidity~~ ultra-violet light, humidity, Moisture, Electric Shortage moisture, and electrical short circuits, all of which can to cause the light lost loss of designed functions. Hence, the co-pending ~~filing~~ parent applications, which are directed to for weather-proof treatment which is treatments, offer substantial improvement for the over the prior art with respect to Moisture, Humidity problems to said elements caused by moisture, humidity, and the like. ~~The current invention to solve following~~ Nevertheless, problems there is a need for additional improvements, including the following:

1. ~~Sealed the~~ The EL-elements may be sealed by a plastic ~~resins~~ resin process ~~may selected by such as~~ injection, pouring, or curing ~~procedure by of a~~

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conventional plastic resin material ~~may~~ selected from the
group ~~material from including~~ PC, PP, PS, PE, PVC, PU,
PET, POLY, Silicone, or any chemical resins, ~~or particles,~~
or liquid ~~with proper procedure to make~~ that enables the
5 EL-element(s) ~~been to be~~ sealed inside to ~~make provide~~
environment-proof properties.

2. ~~Incorporating the Optics Theory may including~~
~~the Optical effects may be provided such as~~ Reflective,
10 Retro-Reflective, Random Reflective, Magnify
~~Image image,~~ Reduce ~~Image image,~~ Focus Arrangement,
Total Reflective, Diffusion, Filter, and Radiation theory
~~effects, and all technical which variations related to the~~
material transparency, finesses of ~~surface~~ surfaces, angle
15 of light beams traveling, Material Thickness, Material
~~Color color and so further may be utilized~~ to make ~~the~~
electro-luminescent (EL) element(s) ~~in of different~~
geometric shape(s) ~~can have exhibit~~ eye-catching effects
for visual viewing.

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3. Further improvement may be made in the circuit
~~technical for technology that provides~~ desired functions
~~may be in group combinations selected from such as~~ fade
in and out, chasing , sequential flashing, pair flashing,
5 scan, pause, and setting of on and off interval intervals to
meet market ~~requirement~~ requirements.

4. Further, ~~The~~ the current invention may
~~incorporated with~~ incorporate other light means ~~may~~
10 selected from conventional commercially available light
~~source~~ sources such as LED, HID, Bulb, Fluorescent,
Cold-Cathode tube, Violet tube, Bulb Tube light, and LOD,
to make the desired combination light ~~to~~ meet market
~~requirement~~ requirements.

15 5. The current invention also can create a workable
sealing incorporating ~~with~~ the co-pending patents'
concept ~~to use a~~ of using center buss-wires as the
electric-signal(s) delivery means with super ~~lowest~~ low
electric-resistance to ~~deliver to as far as possible by~~
20 connect each electro-luminescent (EL) element electrode
to one of the buss-wires. ~~The each~~ Each element's

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electrode may be connected with one of buss-wires, ~~this~~
~~can up to desired numbers and the number of~~ element's
electrodes ~~to and~~ buss-wires may be varied according to
~~as market requirement requirements. The preferred and~~
5 ~~simple examples are as Fig 5 with all details discussion~~
~~later.~~

These improvements ~~can let~~ enable the
electro-Luminescent (EL) element(s) to be sealed inside
10 the plastic resin(s) by a pre-determined procedure
~~incorporated the that~~ takes into account optics theory
with ~~Desired~~ desired transparency, ~~Color~~ color material,
surface Fineness ~~fineness~~ surface ~~by~~ polishing process,
Shape of material for creating desired Image ~~image~~ effects,
15 ~~Thickness~~ thickness of ~~Material~~ material to form the
Image ~~image~~ result, ~~Element(s) and~~ geometric shapes with
resulting in a variety of light emitting and traveling ~~path~~
paths so that ~~can create desire~~ desired light effects can be
created for all devices with super environment-proof
20 quality. ~~Further more incorporated with~~ Furthermore, a

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2nd light means ~~will make~~ can be added for more attractive
light effects ~~than to meet the~~ consumer's expectation.

~~Basing~~ Based on these (5) Major features and
5 ~~improvement~~ improvements, the current invention solves
the environment problem that has held-up widespread
acceptance of electro-luminescent elements for the past
two decades.

10

Figure: BRIEF DESCRIPTION OF THE
DRAWINGS

Fig 1: ~~Disclosure the~~ show a 1st embodiment
~~which of~~ electro-luminescent (EL) element(s) in a
15 preferred twisted tube shape and sealed inside of the
plastic resin(s) by injection procedure for footwear
application.

Fig 2A: ~~Disclosure the~~ illustrates a 2nd
20 embodiment ~~for the details including an~~ arrangement to

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seal twisted electro-luminescent (EL) elements inside the plastic Piece.

Fig 2B: ~~Disclosure the~~ illustrates a 3rd
5 ~~embodiment for details of including an~~ arrangement to
seal the plurality of flat shaped electro-luminescent (EL)
elements inside ~~the a plastic Piece piece with Optics~~
optical properties on the Piece piece for making changing
the light image ~~changed.~~ .

10

Fig 2C: ~~Disclosure the~~ illustrates a 4th of
embodiment ~~for including an~~ arrangement to seal the flat
strip of electro-luminescent (EL) element into a plastic
~~Piece piece with a light emitting direction to thickness~~
15 ~~with loop follow the contour of the piece with variety of a~~
number of ~~optics ditch on the~~ grooves to provide optical
effects at proper locations.

Fig 2D: ~~Disclosure the~~ illustrates a 5th of
20 ~~embodiment for including an~~ arrangement to seal the ~~one~~
electro-luminescent (EL) element, ~~in geometric shape and~~

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with the connection-area also sealed into the plastic ~~Piece~~
~~piece only electric wires~~

~~exposed in the air.~~

..

5 Fig 2E: ~~Disclosure the~~ illustrates a 6th of
embodiment ~~for including an~~ arrangement to seal the
plurality of electro-luminescent (EL) elements in ~~the a~~
fork-shaped enclosure which ~~have~~ has a desired
pitch-distance of each lit-area and ~~have one~~ area having
10 all the elements' electrodes to connect with the
conductive-means to get electric signals.

Fig. 3. ~~Disclosure the~~ discloses a procedure ~~for~~
~~multiple procedures to seal~~ for sealing the said element(s)
15 inside the desired plastic resin(s) materials, ~~further more~~
~~the procedure included to add the~~ including provision of a
heat-transfer film which ~~offer the simple procedure to add~~
facilitates addition of the artwork, color, indicia, designs
on the plastic ~~Piece piece~~ within seconds while ~~apply the~~
20 applying a 2nd injection process.

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Fig 4A-4D: ~~Disclosure the~~ illustrates a preferred embodiment ~~for the~~ of an optics arrangement for the plastic ~~Piece piece~~ to ~~make~~ provide visual effects with and desired light effects ~~including to use by~~ controlling plastic material thickness, transparency properties of the plastic material, ~~finesses~~ plastic piece finesses, Convex or Concave design, ~~Added addition of other material into~~ Chemical materials of chemicals to get diffusion effects, as well as the addition of. ~~It also disclosure the~~ Silkscreen(s), Masking(s), Window(s), Stencil(s), Cut-Out(s), Opening(s) ~~apply to~~ sections of the Plastic plastic piece ~~related to the corresponding to~~ EL-element(s) lit-areas positioned to get desired effects.

Fig 4D: ~~Disclosure~~ illustrates the procedure for sealing procedures of the preferred embodiment for micro-injection applications which use a ~~Pouring pouring~~ process and not by an injection machine, as well as a. ~~It also disclosure the~~ Stitching stitching-edge for a contour ~~so that can~~ easily be added on any application's surface.

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Fig 5: ~~Disclosure the details application for~~
illustrates an embodiment including electro-luminescent
(EL) element(s) sealed inside a Plastic-plastic Piece-piece
and the a method to connect with a plurality of number of
5 such sealed Electro-luminescent (EL) element(s) into a
desired length, loop, linear, configuration, path, or route
by a variety of shaped connectors which make a desired
linear arrangement.

10

~~Detail Description:~~ DETAILED DESCRIPTION OF THE
PREFERRED EMBODIMENTS

The preferred environment proof treatment for the
15 geometric designs or shape of Electro-Luminescent
element(s) involves sealing the said element(s) inside the
plastic resin(s) by an injection process or the preferred
and equivalent of method may ~~including the include~~
pouring, or hand-operation of such process to ~~get the said~~
20 to properly EL-element(s) been sealed properly.

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The plastic resin(s) or particle(s) are individual pieces and will become a single piece after the resin(s), particle(s) have been treated under certain at a predetermined temperature, pressure, heating, and timing though ~~the~~ with appropriate tooling. ~~Well control the all~~ All of these factors are controlled to meet be compatible with the electro-luminescent (EL)-element(s) properties ~~can to seal~~ the said elements within the plastic piece with designed light brightness, appearance, and viewing effects, and to overcome the environment damage that may be caused by nature or the human forces including the damage due to humidity humidity, water, temperature, violet ray ultra-violet rays, impact strength, bending, deforming, pulling, broken, breaking, heat, stitching, and ~~so on all reasons any other effects to that might cause the~~ said element(s) ~~lost its to lose their~~ designed function(s), light output(s), brightness, and color(s).

The preferred procedure for high efficiency and less labor is to accomplish the sealing by the using an injection machine ~~to make this sealing.~~ The tooling for

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this plastic injection may be designed to hold the EL-elements well before injection and carry out one injection process to make nice and good sealing. This procedure and tooling design ~~basing on the preferred~~
5 ~~purpose for different application and not discuss because~~
~~easily to do from conventional market~~ is not discussed in
detail herein since it is conventional in a variety of
applications. Properly ~~control~~ controlling the injection timing, temperature, pressure and ~~selected~~ selecting the
10 plastic resin(s) to match the EL-element(s) properties will ~~make good injection to see~~ enable the EL-elements to
be visible within the plastic piece. Alternative ~~way to~~
~~prevent from loose of one-time~~ injection, the injection procedure can ~~become~~ use multiple steps, ~~for examples~~
15 example to make provide the 1st injection piece with pre-designed groove(s), ditch(s), and/or Shallow Area(s) and install the geometric element(s) inside the groove(s), ditch(s), and/or shallow area(s) ~~to make prior to the~~ 2nd
~~times injections~~ injection procedure to seal the
20 EL-elements.

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Further—more, the injection procedure can be
carried out a plurality of times to inject by machine or
human operation to ~~make~~ accomplish the a desired result
such as Micro-Injection Application which ~~use~~ uses a
5 predetermined tooling and ~~use~~ multiple different color
resin(s), and liquid Chemical materials to inject into all
the shallow areas(s), groove(s), and/or ditch(s) ~~so the~~
~~procedures are more than two times injection method to~~
accomplish a variety of effects beyond those that can be
10 obtained with two-time injection. Basing the By selecting
an appropriate liquid chemical(s) for the micro-injection
procedure, ~~so the~~ sealing technical technique need not be
limited for to the Plastic plastic resin(s), particle(s) but
~~also means including all the~~ but also may be used for
15 different construction constructions of the plastic in
solid or liquid forms. ~~This have~~ A variety choice of
choices from the market place may be selected ~~of,~~
including PC, PP, PVC, PE, PS, Acrylic, PET, PU, Rubber,
Silicone, which are ~~refine~~ refined from ~~the oil procedure~~
20 petroleum, or its a related material such as Rubber from
trees, ~~oil or~~ hydrocarbons other than petroleum from

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ancient ~~animal~~animals under ground, any of which may
~~consider~~be considered to apply ~~for this to the~~ invention.
~~It also can be covered for~~ The invention may also utilize
Chemical or ~~Plastic~~plastic resin(s), article(s), and
5 liquid(s) other than those noted above to ~~make the same~~
~~material join materials~~join together by its Chemical
~~properties~~to form composite materials.

The each electro-luminescent EL-element(s) have
10 ~~its~~ output-end(s) in the form of ~~the~~ area(s) including ~~the a~~
Common-electrode and desired positive electrode(s). ~~The~~
It is conventional for the negative or common electrode
~~which preferred to be formed as the an ITO layer to make~~
~~this common electrode.~~ The conventional market ~~preferred~~
15 prefers to use Silver paste to make connection with
different lit-area(s) phosphor to form the Positive
electrode (Lit-area(s)'s electrodes). All these electrodes
of the ~~said~~ element(s) can be connected with metal
terminals, and a flexible Printed Circuit (FPC) by means
20 including punch, contact, or conventional available
~~method~~methods to build the signal(s) delivery means.

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Such connection points may be sealed inside the plastic
~~Piece-piece~~ or outside the ~~Plastic-plastic Piece-piece~~
~~basing on the depending on the different~~ application so
~~this may be described as that the electrical connections~~
5 ~~may be partial-partially~~ sealed or ~~optional-optionally~~
selected to be sealed within or outside the plastic Piece.
There ~~have a lot of consideration basing~~ are also many
additional considerations base on different ~~requirement~~
requirements for different applications. The EL-element(s)
10 ~~also an can for example be pretreated as the pre-formed as~~
a twisted EL panel tube light as corresponding to that
described in the Applicant's co-pending filing, From Fig.
(1), one can see that the twisted tube EL-element(s) are
sealed inside plastic ~~but this is but~~ pre-twisted so as to
15 allow the EL-element(s) can to be sealed inside ~~a an~~ "L"
shaped plastic Piece. ~~As for Preferably, the Panel, Sheet,~~
or Strips for "L" Shape bending, A preferred method is are
arranged to let the light within illuminate the Plastic-
plastic Piece-piece on proper orientation, as shown in Fig
20 2C. This can ~~incorporated with other accomplished using~~

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optics theory to make light be visible with excellent
~~result~~ results as indicated in Fig 4A, Fig 4B, and Fig 4C.

The light effects of said element(s) ~~can be make~~
5 ~~visual result while~~ are achieved when proper sealed by the
plastic piece from due to appropriate design and selection
of the resin(s), particles(s), liquid(s)—with prefer
designed, the Thickness ~~thickness~~ of the plastic material
(Fig 4A, 4B, 4C), ~~Fineness~~ fineness of surface(not shown),
10 Transparency of Material, Diffusion grade, Diffusion
material added (Fig 4C), other particle(s) added, Shape of
the ~~Plastic~~ plastic piece, and as normal normal light
means treatment. Most important is that all sealing
~~procedure~~ procedures have to match the EL-element(s)
15 properties, including the EL-element(s) deforming
temperature, ink properties, phosphor properties,
lamination properties, tightness of lamination, minimum
bending radius and all other factors which ~~will cause~~ must
be taken into account to prevent the L-element(s) from
20 been damaged by the sealing processes. The said ~~visual~~
~~result which means including the light beams be seen with~~

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parameters affected by the sealing processes may include
image, size, brightness, clearance, color, direction~~are~~
~~different with the said element(s) not been sealed.~~
~~Incorporated~~ These effects may be combined with
5 ~~co-inventor's~~ the inventor's earlier patented concept for
positioned the said element(s) with front window(s),
cut-out(s), and Silkscreen area(s). The current invention
can also have all these treatments on the plastic surface
to make desired light effects with indicia(s), Character(s),
10 design(s), art-work(s) ~~be lit for some advertisement~~
~~purpose purposes.~~ ~~This can get from~~ These treatments can
be obtained using simple tooling designs (Fig. 3),
masking (Fig 3), stencil, silkscreen printing (Fig. 4B),
and/or surface treatment of the plastic Piece's surface
15 ~~treatment from by~~ conventional market technical
techniques. Further more, the transfer ink film technique
also can ~~add on~~ utilize the injection machine so can add as
to modify the Plastic-Piece's surface with to have a
desired appearance while ~~use this~~ using conventional
20 ~~technical techniques~~ for simple masking procedure with to
vary color, and design, and indicia. ~~It also can add some~~

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~~other~~ Other material or particles (Fig. 4C) such as Small
metal ~~piece~~ pieces, metal powders, particles within the
chemical's resin(s), particle(s), and/or liquid(s) ~~to can~~
also be added or mixed together and get some to provide
5 diffusion objects inside the plastic piece so the light
beam will be reflective ~~to in all direction to directions~~
and cause more splendid light effects for the viewer.

~~The incorporated other~~ Additional light-means that
10 may including the be incorporated include conventional
~~available~~ light means ~~from such an~~ LED, Bulb, Organic
electro-Luminescent, Organic LED, and LOD ~~which is~~
powered by batteries, which can supply enough life time
for the applications. ~~While~~ The additional light means
15 may be sealed together with the ~~said~~ electro-luminescent
element(s) ~~will have to provide for~~ other taste and visual
effects.

This is the big improvement for the environment of
20 the element(s) and other light means for certain
applications.

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~~From Fig.1: Disclosure the~~ In more detail, Fig. 1
shows twisted element(s) sealed inside Plastic-Piece
piece (01). The twisted EL-element (011) ~~has details~~
5 ~~description of~~ may be the same as those described in
co-pending filed on U.S. Patent Application Ser. Nos.
10/170,874, and 10/285,451, and 10/286,820. The twisted
element(011) are twisted ~~surround around~~ the center
central electric-wire(s)(012) ~~with, and~~ the electrodes
10 (not shown) of the element(s) are connected with center
central electric-wire(s) (011) and outside electric-wire(s)
(014) ~~though desired method including through an~~
appropriate connection method such as the use of
Clamp-Terminal terminals (not shown), — which are
15 punched ~~though through~~ the EL-element(s) electrode(s)
and held held so can to allow a soldering process to be
carried out. This is one preferred method, The
alternative way can have the is to use a Flexible Printing
Circuit (FPC), which are can use the Silver Paste to glue,
20 curing with the electro-Luminescent element(s) electrode
so can apply as to enable the soldering procedure to be

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carried out. ~~It~~ One can also ~~can~~ use a ~~the~~ Printing
Conductive material such as Silver Paste ~~only but it~~
having a higher electric resistance for this arrangement.
~~To build the~~ Those skilled in the art will appreciate that
5 the EL-element's electrode(s) with and the corresponding
electric wire(s) have electrical connections may be
constructed using a lot of alternative method from
convention market which currently-available methods,
and that the invention is not limited to this preferred
10 embodiment discussion but still inside current invention
coverage. From the As shown in Fig (1), the EL-element(s)
electrode(s) are connected with electric wire(s) (012)
(014) to build form the electric Signal(s) delivery means.
This connection-area (013) with provides a durable
15 electric connection and is sealed by shrink-tube or
hot-glue, silicone, epoxy, tape, or paper tape to hold all
connection-area(s) well. The Connection-area (013) is the
weak area for a whole EL-element(s) application,
especially for the waterproof requirement with respect to
20 waterproofing requirements, so but the current invention
solved solves this problem because this connection-area

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(013) is well sealed inside the Plastic-~~Piece~~-piece ~~well~~.
From Fig. 2A, ~~The~~ the Plastic-~~Piece~~-piece (021) is
injected at an earlier time and with a ~~grove~~-groove (027)
which ~~to allow~~ allows the twisted EL-element (024) to
5 ~~well install~~ be installed well within the groove (027)
because the groove (027) is a little smaller than the
diameter of twisted EL-element (024) ~~for diameter so that~~
the twisted EL-element can fit into groove very ~~tight~~
tightly and prevent ~~from~~ the twisted EL-element (024)
10 ~~deform the shape from deforming or loosening and become~~
~~the loosen construction~~. The EL-element (024) ~~are~~ is
twisted ~~surrounded around~~ the center Buss-wires (023)
which ~~offer the~~ carry electric-signal(s) with very low
electric-resistance ~~so can to~~ supply expected
15 electric-signals with sufficient power to turn on the
EL-element(s) for super brightness. The Center
Buss-wire(s) (025) are connected with EL-element
~~electrode electrodes~~. It ~~also have the~~ The outside
conductive-means (029) may also be connected with
20 another EL-element ~~other~~ electrode ~~so to~~ build the
electric-circuit to make to control additional light with

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function(s). The Twisted EL-element (024) has emits light
emitting in an outward direction to cover ~~the 360 degree~~
degrees so the light output as super value and thereby
provide a neon light effect. ~~After the~~ The twisted
5 EL-element (024) and its connection-area (028) ~~well are~~
then installed and put into an injection machine to make
~~the a 2nd injection to~~ and allow the 2nd injected part (022)
to join with the 1st injected part (021) without any gap, or
~~hole so can have environment grade to provide a quality to~~
10 environmental seal and prevent from the humidity
humidity, water, bending, and impact from causing
damage to ~~cause the EL-element or connection-area been~~
~~damaged.~~

15 ~~From~~ As illustrated in Fig 2B, The the 1st injected
part (2B) ~~have~~ has two shallow areas (2B01) and (2B02)
which ~~allow~~ accommodate the two piece of Flat ~~flat~~
EL-Elements ~~on the shallow areas.~~ ~~————~~ The Each
EL-element has its selected lit-areas ~~————~~ (2B04),
20 (2B05), (2B06), (2B07), (2B08) which ~~has the~~ have a
phosphor coated on these location thereon and which are

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positioned with the 2nd injection part's related areas (A),
(B), (C), (D), (E), ~~which each area has the~~ having a
different optics lens design. ~~such as~~ For example, area (A)
is a square raised lens positioned ~~with over~~ lower Star
5 lit-areas, (B) is a raised shaped lens to positioned over
lower AARON lit-areas, (C) is a rectangular raised lens
positioned ~~with over a~~ lower FLOWER lit-area, (D) is a
round raised lens positioned ~~with over a~~ lower
THUNDERBOLT lit-area, (E) is a ~~eylinder~~ cylindrical
10 raised lens positioned over a lower ROUND lit-area. The
2nd injection piece ~~with has~~ certain location with
window(s) positioned ~~with over~~ lower EL-element's
lit-areas. This is described in the current inventor's early
issued patents US5,572,817, US5,794,366, US5,752,337,
15 US5,833,508 ~~so we do not discuss here with details~~. The
connection-area (2C) and (2D) is also install ~~installed~~ on
the shallow areas (2B02) and (2B01), and sealed ~~by~~ during
the 2nd injection so all these most weak areas are also
sealed and get ~~well~~ good protection.

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From—As shown in Fig 2C—, the 1st injection plastic-part (2C01) ~~with teeth ditches~~ has toothed areas to create desired light effect(s). The 2nd injection part (2C02) ~~is~~ has a smooth radius surface so can let people have
5 ~~comfortable wearing while this~~ that the device can be comfortably worn when the device apply to the ~~is applied~~ to a sandal. The 1st injection part (2C01) has the groove for the EL-element in strip form (2C10) can easily install to facilitate installation. The EL-element (2C10) ~~with~~
10 emits light emit outward as AAROW outwardly to form the word AARON as shown. The preferred arrangement is ~~make to cause the EL-element has the~~ to have a loop to follow the contour of the injection plastic-piece with the wider shallow area (2C08) to and allow the EL-element's
15 connection-area (2C06) can ~~Install well~~ to be well installed. The two EL-element's electrodes (2C11) and (2C12) connected with outside conductive-means (2C05) are sealed well within the shallow area (2C08) ~~so can be sealed~~ after the 2nd injection is applied to the 1st
20 injection part.

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From Fig 2D, the 1st injected-part (2D01) ~~have~~ has
a shallow area (2D07) to install the EL-element (2D03).
The wider shallow area (~~—~~2D05) ~~to install~~ enables
installation of the connection-area (2D06) including the
5 EL-element's 4 electrodes, 4 soldered points, 4 outside
conductive-means, which ~~have~~ are pre-sealed by
shrink-tube. The 1st injected part (2D01) has ~~the~~ a
geometric shape to allow ~~the light emitting to be emitted~~
outside with a desired viewing angle. ~~Same as~~ Similarly,
10 the 2nd injected part (2D02) also has ~~the~~ optics designs.

~~From~~ As shown in Fig 2E, the 1st injected part
(2E01) and 2nd injected part (2E02) ~~with~~ have a convex
lens design to let the light image become bigger ~~basing~~
15 based on ~~the~~ optics theory. ~~—~~ The 1st injected part
(2E01) has shallow-areas (2E03) to allow ~~install~~
installation of an EL-element which ~~have the~~ has a fork
design with 3 lit-areas (2E06) (2E07) (2E08) ~~with~~ and a
pitch-distance sufficient to make a special design and
20 colors. The wider shallow-areas (2E04) (2E05) ~~are~~ allow
the connection-area to fit well within the plastic-piece.

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The ~~Connection area~~ connection areas have the ~~4~~
EL-element's electrodes (2E09), ~~and~~ ~~4~~ outside
connective-means (2E10), ~~and~~ 4 soldered points (not
shown), which are sealed within the shrink-tube (2E11).
5 The flat EL-element does not have the center buss-wires
which ~~existing~~ are used for the Twisted EL-element ~~as of~~
Fig (1) and Fig (2A).

~~From~~ As shown in Fig 3, the 1st injected part (032)
10 ~~have~~ has a plurality of number and pre install
pre-installed EL-elements (033) into in the 1st injected
part (032). The conductive-means (034) are outside the
plastic-piece after the 2nd injection is done. ~~The one~~ One
masking film is added before the 2nd injection. The film is
15 heat-transfer film which can use ~~the~~ a predetermined
temperature, or pressure by machine operation to transfer
the artwork, indicia, color, characters, design to the
plastic-piece's surface. This will ~~make the~~ cause light
transmitting, ~~traveling plastic piece's will be much~~
20 having a very good appearance under this with a simple
process. ~~—~~ This embodiment also may ~~incorporated~~

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with the features described in the current inventor's
Issued patent US 5,572,817, ~~as above listed~~ as discussed
above. The cosmetic appearance of the surface of
plastic-piece (032) ~~cosmetic may also created by add be~~
5 modified by adding the extra particles, resins, powders,
ink, colors or equivalent material(s) to cause the light to
transmit with visual change effects. ~~The~~ A simple method
is add ~~the~~ extra materials inside the injection material
input tank (037) ~~after the well to be~~ mixed with
10 plastic-piece original materials.

~~From~~ As shown in Fig 4A, the plastic-part (4A)
~~have~~ has the two radius parts (4A01) and (4A01'). The
plastic-part (4A) is sealed two sheets of EL-Elements
15 (4A08) and (4A09), each of the ~~EL-element~~ EL elements
~~has~~ having desired lit-areas including lit area (4A02) of
EL-element (4A09). The lit-areas (4A06) and (4A07) are
for EL-element (4A08). ~~The each~~ Each lit-area ~~have~~ is
positioned ~~with the~~ relative to a certain window to get ~~the~~
20 desired light optics properties such as the lit-area (4A06)
positioned ~~with~~ over window (4A03), which is a convex

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lens. The lit-area (4A07) of ~~flower~~ flowers are positioned with respect to window (4A04), which is a convex and raised lens for ~~magnify~~ magnifying optics properties. The lit-area (4A02') is positioned ~~with~~ relative to the convex lens (4A01') for enhancing the whole EL-element's lit-area. ~~From the Fig 4B show the~~ shows a V-shaped EL-element (4B) which has a plurality of lit-areas (4B01), (4B02), (4B03), (4B04), (4B06) ~~are~~ positioned with respect to upper windows ~~with having~~ different treatment

10 treatments including 2-shaped raised lens (4B10) related to the backlight (4B01). The star-shaped raised lens' window (4B09) is positioned with a lower lit-area (4B02). The flower shaped lens' window (4B08) is positioned ~~with~~ over the lower lit-area (4B03). The thunderbolt-shaped

15 window (4B04) is positioned over a lower lit-area in the shape of a backlight design. The Silkscreen printed window (I) and ~~(heart-shape)~~ (U) of the plastic-piece may ~~be include~~ alternative treatment including treatments

20 such as cut-outs, masking, stencil, heat-transfer art work, or a raised lens in front of the lower ~~backlight function's~~ backlight's lit-area.

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~~From the~~ As shown in Fig 4C, the added particles, materials, and reflective pieces can ~~let enable~~ the light transmitting channel to change and make diffusion light effects. The Plastic-piece (4C) has an EL-element inside, which emits ~~with light emitting to outward~~. The Plastic-piece has mixed ~~the other particles, material or materials~~ (4C02) to make change the inner light beams' pathway ~~changed to make and create~~ special light effects.

10

~~From the~~ As shown in Fig 4D, ~~The the~~ heart shape micro-injection ~~piece pieces~~ (4D) (4D') both have ~~the~~ windows to allow ~~the light can to~~ pass though from the areas (4D01) (4D02) (4D04) (4D05), (4D07). Each window has ~~the a~~ lit-area ~~to positioned and with to provide~~ different ~~color colors~~ and different ~~light~~ light effects as required. ~~The~~ Both Heart-Shaped Micro-Injection ~~piece pieces~~ are made by human labor to ~~injected inject the a~~ liquid material into the different ~~groove grooves with some of~~ areas (4D01) (4D02) (4D04) (4D05), (4D07) with light passing though. Both ~~has the~~

20

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also have a stitching edge (4D03) and (4D06) for to
enable stitching purpose to any main objects too object.

~~From As shown the in Fig 5, The the~~ EL-element
5 (05A) is sealed inside the plastic-piece with two inner
buss-wires ~~having~~ incorporated with two of the
conductive-means (058+) and (058-) on both ends. The
Pin-type conductive means (058+) and (058-) can easily to
connected with a socket set's receptacles (059+) (059-)
10 respectively. The electric-signal from ~~the socket~~ (058+)
though the buss-wire inside the plastic-piece to the end
(059+) is the same electric signal just with except for tiny
difference basing on differences resulting from the
electric resistance by of the buss-wire material. ~~No any~~
15 ~~big~~ A large voltage, frequency, and current change are not
required because the buss-wire ~~have~~ has sufficient amount
of signals ~~can to~~ offer to a plurality of EL-elements to
connect to a desired length. The 1st EL element (05A) ~~till~~
to the last EL element (05I) will have the same
20 brightness because each of the EL-elements ~~only drain~~
less current from Buss-Wire ~~because~~ since all

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EL-elements are ~~hook with~~ connected to the buss-wire by
a parallel connection as long as the Buss-wire can carry
enough signals (Currents) ~~and well design of the~~
~~specification, then, this will solve~~ This solves the
5 problem with the other ELAM — (Israel-US 5,485,355)
3D EL element of limited current carrier carrying
capacity of its outer coil electric-pole. ~~Even~~ The current
inventor has related utility ~~patent right~~ patents
US 6,270,229 and US 6,082,867. Hence, ~~The~~ the use by
10 the current invention use of the center buss wire(s) to
delivery the current (Signals) and the parallel connection
of all EL-elements are in parallel connected with the
center buss-wire(s) can make a big improvement for
~~connected~~ connecting an unlimited number of EL-elements
15 to designed for a combined lighting arrangement having a
desired length, configuration, loop, or linear path for
indoor and outdoor lighting application is the and other
~~purpose~~ purposes.

20 ~~From~~ As shown in Fig 5, The the Buss-wire(s) have
conductive-means (058+) and (058-) ~~expose~~ exposed to

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the air. The current carried from ~~the~~ conductive-means
(058+) and (059-) ~~traveled~~ travel through the (05A)
buss-wires of EL-element (05A) to ~~the other end~~ have
ends having the conductive-means (059+) and (059-),
5 respectively. The voltage, current, and frequency
measured at the two ends of EL-Element (05A) ~~is~~ are
almost the same with limited tiny changes ~~basing~~ based on
the buss-wire(s) internal electric-resistance. The outside
conductive-means (059+) and (059-) are connected with
10 Receptacle (S1) to be connected with ~~EL-element's (05B)~~
outside conductive-means (060+) and (060-) of
EL-element (05B) respectively. The electric signals
~~traveled~~ travel through the EL-element (05B) to the other
end's conductive-means (066+) and (066-). The
15 Measurement for the current voltage, frequency, current
will keep almost the same ~~from~~ as signals are carried by
the conductive means ~~as this~~ along the following simple
path:

(058+) → (05A) → (059+) → (S1) → (060+) → (05B) → (06
20 6+) → (S2) → (067+) → (05C) → (062+) → (S3) → (064+) → (065+
) → (068+) → (069+) → (070+) → (071+) → (072+) → (073+) → (0

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73+) → (074+) → (076+) → (077+). This means the ~~electric~~
~~current with~~ voltage, frequency, ~~— and~~ current amount
~~by mini amperage do~~ undergoes only tiny changed changes
from the start point to the application end. This is a big
5 improvement for the conventional Christmas light string,
made of Israel (ELAM) EL wires. Same as The same is true
for the negative current while along the above-listed
travel path as above listed.

10 The EL-element within the individual unit, such as
(05A), (05B), (05C), (05D), (05E), (05F), (05G), (05H),
(05I), (05J), ~~have the EL element (053)~~ is twisted
~~surrounded around~~ the center buss-wires (052) and (052')
~~incorporated — and~~ incorporate the preferred
15 receptacle-means to become well construction device
~~which can connect with outside signals ends or the other~~
another device, and which can easily be constructed to
have a desired length, configuration, shapes or shape for
market requirement, — requirements. The EL-element's
20 electrode (055) is connected with buss-wire (054) by
~~soldered soldering on~~ terminals which are punched ~~though~~

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through and clamp on the electrodes. The terminal ~~is one~~
~~of conductive means~~ it can be any shape as long as it is
conductive for electricity. The individual device which
~~have~~ has the EL-element with ~~Plastic~~ plastic sealing and
5 ~~receptacle-means~~ can ~~install for~~ be installed in any
application, such as a garden light, fish tank, balloon or
other applications, or utilities. The receptacle-means ~~can~~
main purpose is to offer a receptacle to receive the
EL-element's ~~exploded~~ exposed conductive-means, or to
10 offer ~~a~~ attachment-means to ~~apply~~ attach to the
application or utility. The receptacle-means can have
multiple-ends to receive a plurality of exposed
EL-element's conductive means. It also can have
attachment-means ~~on the~~ at a certain location to ~~offer~~
15 ~~install~~ enable installation on main-objects so ~~can~~ as to
allow the individual device to ~~join~~ be joined with
~~mian object~~ a main-object for desired construction, ~~and~~
the device is serving as a light means with receptacle as
base or as attachment-means.

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The EL-element's ~~others~~ other electrode (056) is connected with a buss-wire (057) by ~~soldered~~ soldering. The buss-wires (052') and (052'') have two ends with ~~electric wire~~ electric wires outside the plastic skin. In order to make ~~the~~ a good arrangement, the buss wires (052') and (052'') may ~~ask~~ be provided by a wire factory ~~offer as the wire with pre-cutted~~ a pre-cut arrangement ~~as~~ (054') and (057') so there is ~~no any~~ none of the risk ~~for~~ entailed by soldering work ~~with on the~~ EL-element electrode (055') and (056') ~~without the shortage issues~~.

~~From receptacle~~ Receptacles (S1), (S2), (S3), (S4), (L1), (L2), (Y1), (X1) ~~with~~ may have desired designs and construction ~~which as~~ needed to meet the requirement to fit all ~~kind~~ kinds of linear curvature, curvilinear, loop, or path for universal ~~to fit for in a variety~~ application of applications. The receptacle ~~should be~~ may have all kinds of shape ~~may similar with the Plumping, for compatibility~~ with a Bulb tube light set etc. However, the The current invention ~~offer~~ offers an environment sealing process for EL-element(s) with durable ~~quality to~~ such as resistance

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against ~~the~~ a bend, scratch, water, ~~humility~~ humidity,
impact force, ultra-violet ray, pull, twist, press, or punch
~~so can have good quality~~. The Receptacle shape may
~~select~~ selected from the "L", "S", "Y", "T", "X" type to
5 allow the EL-elements in tube construction ~~can~~ to be
assembled into any linear curvature requirement. These
~~list~~ listed shapes are preferred embodiments and do not
~~the limitation limit~~ the scope of the current invention.

10 Although preferred embodiments of the invention
have been described in ~~details~~. It it will be appreciated
that the scope of the invention is not to be limited to the
described embodiments, but rather that the invention is to
be interpreted in accordance with the appended claims.

15